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MANAGEMENT AND TREATMENT OF EAR, NOSE AND THROAT CONDITIONS BY PHYSICAL MEASURES

By CHARLES R. BROOKE, M. D.

That the nasal accessory sinuses play a primary role in the causation of diseases from focal infection is generally admitted. H. Ross Skillern, at the 1926 meeting of the American Laryngological, Rhinological and Otological Society, regards the nasal sinuses as an infrequent cause of systemic infection, with the possible exception of the ethmoid and sphenoid cells, and, contrary to common opinion, he states that those sinuses which drain more freely are the least likely to produce general or systemic signs of infection. Apropos to these remarks the essayist can only emphasize the fact that experience has shown that the lack of drainage in sinus disease is directly responsible for the general or systemic symptoms that are found to exist in some cases. But we must differentiate between true focal infections and direct extensions of infections from the affected sinuses, or rather the relationship between sinusitis and subacute pharyngitis, laryngitis, bronchitis and other infections of the upper respiratory tract. The production of drainage, therefore, is the keynote of success in the treatment of nasal accessory sinus disease.

Physical measures have been found to give positive benefit in acute, subacute and chronic conditions of the throat, ears and nasal tract, its accessory sinuses included. Although the application of the various physical modalities have been successfully employed for the relief of many affections of the upper respiratory tract, we still believe that each case must be strictly individualized and that no one can say in advance that this or that combination of methods will be applicable to every case. Therefore, emphasis should be put on the necessity for complete findings in each case, together with a thorough examination of the ears, nose and throat by transillumination, including in some cases X-ray findings and reports of smears and culture growths to substantiate complex clinical symptoms and findings.

A carefully prepared case record should be made of all clinical findings and subjective symptoms. Upon completion of this record, a prescription of the indicated physical measures can be readily outlined.

The following modalities have been used with notable success in treatment of upper respiratory tract pathology: Radiant light and heat, diathermy and intranasal high frequency currents, ionization and the ultra violet rays. Radiant light and heat is particularly indicated in acute colds in the head, acute and subacute nasal and sinus diseases, earache and otitis media.

Technic. Radiant light and heat energy. Any standard type radio vitant lamp, carrying a 500 to 1,500 watt bulb, is directed

over the face or ears, with the eyes closed, according to existing condition, for from twenty to thirty minutes, sometimes longer but never for a shorter duration. If the patient is sensitive to light, the eyelids can be covered with moist wads of absorbent cotton; this, however, seldom is necessary.

Therapeutic effects: Radiant energy has a distinctive and selective action on the tissues exposed, giving a uniform temperature, which produces an active hyperaemia. This application gives at once a definite amelioration of symptoms. The convective heat produced from reflected light therapy soothes the part, relieves spasm and pain and has been proved clinically to be far more beneficial than the application of heat from without by such local applications as poultices, counter irritants, hot compresses, hot water bottles, etc.

Clinical experience shows that the application of radiant light and heat energy produces an active hyperaemia, relieves the sense of fullness and congestion, enhances local nutrition, soothes the pain and promotes comfort, when applied to the facial regions for relief of coryza, rhinitis, acute and subacute sinusitis, catarrhal deafness and otitis media.

Diathermy has been found to be the most dependable modality in electrotherapy for the treatment of nasal accessory sinus disease, in the acute, subacute or chronic stages. The treatment by diathermy must not be considered from any other point of view than heat production, and it should be used only when heat is therapeutically indicated. The application of heat produced from the D'Arsonval circuit of a dependable high frequency machine can be regulated as to dose, accurately localized through the affected tissues, and conveniently applied to the facial, head, throat and neck regions of the body.

Diathermy produces a definite warming of the tissues in the path of the current between the electrodes, the effect of which is an increase of arterial blood supply, increased drainage, analgesia, improved local nutrition and metabolism, thus having a decided favorable influence on the particular disease process.

Technic. "Application of diathermy." The application of diathermy in subacute and chronic disease can be given in two ways, the modified sedative and the direct sedative, the former being the choice in pansinusitis and the latter in uncomplicated and postoperative sinusitis.

The application "modified diathermy" is made in the following way: A diffusive triangular or oval shaped electrode is used, average size about 2½ x 3½ inches, made of 22 gauge combination or Crooks' metal. The triangular shaped electrode is moistened and applied to the upper cervical and occipital regions, which area should be moistened or a wet chamois interposed about the size of the electrode. When the oval electrode is used, it is placed over the interspace between the seventh cervical and the first dorsal spines in the same manner as above. The electrodes should be always placed to

insure perfect contact and then bandaged or secured firmly to the part. The connection is made to one of the D'Arsonval binding posts of the high frequency machine. The active electrode is a non-vacuum electrode, the size of which ranges in character, depending on the regions to be treated, and is connected to the other D'Arsonval binding post. The position of the patient may be either sitting or lying. The latter is preferable, as it permits complete relaxation. The active electrode is moved slowly over the involved areas, using a current strength which is comfortable to the patient. This method permits a general warming of the affected areas, together with the adjacent areas of distribution of neuralgic pains. During this treatment the non-vacuum electrode can be allowed to remain over the involved area for concentration of the heat as long as tolerable to the patient, which is usually only for ½ to 1 minute duration but must be repeated in sequence with the first step of the application throughout the twenty to thirty minutes' duration of the treatment.

Technic. Application direct diathermy. In this application the active electrode is a strip of combination metal cut to exactly fit over the affected area, as, for example, over the antra or forehead. The diffusive electrode of the same material, but a little larger, is placed over the cervical spines. A current strength to the tolerance of the patient is allowed to pass for twenty to thirty minutes' duration, the electrodes being moistened and bandaged on in the usual way. In certain cases of sinus disease the combination of the modified and direct diathermy methods are more beneficial than either singularly applied, particularly so in severe pansinusitis with severe neuralgic pains, and when given, the direct method should precede the indirect or modified method.

The therapeutic effects of diathermy are local vasodilation, a deep hyperaemia, locally confined penetration of heat, antispasmodic action, a marked sedation, increased drainage, increased local metabolism and nutrition of tissues and accelerates the removal of waste products. The application should be given daily at the onset, reduced to alternate days and then as symptoms warrant. The average effective dose of direct diathermy is about 500 milliamperes of current. The essayist has found the combination metal electrodes cut to fit the individual patient more successful than the mesh sponge electrodes and the head crown apparatus devised by Drs. Holland and Cottle for the treatment of sinus infections.

The intranasal high frequency application should be given following diathermy in all severe acute and chronic nasal and sinus affections. The intranasal high frequency application thoroughly warms and vascularizes the hypertrophied or constricted nasal membranes, thus restoring a normal action to the devitalized nasal mucosa.

Therapeutic effect: Intranasal high frequency produces a superficial hyperaemia of the nasal mucosae, decongests the swollen and

congested turbinates and aids in the production of drainage through the sinus openings.

Technic of intranasal high frequency application. A non-vacuum insulated nasal electrode is attached to Oudin or D'Arsonval terminal of a high frequency machine. The latter is preferred by the writer, because the current is smoother and warmer, thus tolerated better by the patient and at the same time gives the maximum effect in the minimum time. In this application the other terminal of the D'Arsonval circuit is connected to the oval metal electrode already referred to, which is placed over the interspace between the seventh cervical and first dorsal vertebrae, because at this point there is a reflex action produced upon the sympathetic trunk to the nasal ganglion, which assists in relieving the congestion and irritation within the nose. The current strength should be tested out by touching the electrode to the tips of the fingers or lips before inserting into the nose, start with a weak current and step up tc tolerance after the electrode has been in the nose for about two minutes. Duration of treatments—ten minutes to each nasal chamber. The electrode should be inserted gently, not forced, as far back into the nasal cavity as possible. The electrodes are made flat or round with medium and sharp angles and the type should be selected in accordance with the existing condition and contour of the nasal chambers.

The ultra violet rays are important adjuvant treatment in all infections of the nose, throat and ears. Ultra violet irradiations are safe and potent in competent hands and are indicated in all cases of infection of the nasal mucosa, because such local conditions hinders favorable changes of the sinus mucosa. Ultra violet rays are beneficial in cases of acute tonsilitis, incipient peritonsillar abscess, laryngitis, nasopharyngitis and in middle and external ear infections. A 2 per cent solution of mercurochrome is applied to the throat and nasal cavities in all acute infections.

Therapeutic action. The ultra violet rays have a dual action, in that the spectral bands are chiefly bactericidal from the water cooled lamp and chiefly biological from the air cooled lamps. The essayist makes it a practice to adminisiter the ultra violet rays emitted from both the water-cooled and air-cooled lamps in nearly all cases of local infection—the former applied locally to affected tissues through the medium of quartz rods to destroy infection and the latter to the surface of the body to be taken up by the circulating blood, thus increasing the general body resistance by favorable action on the blood chemistry. Locally, the effect is a sterilizing one and generally a synergist to the body.

Technic of ultra violet radiations. Intranasal ultra violet rays are given via a Muehler Nasal Quartz Applicator, attached to a water-cooled lamp. The applicator at first is inserted gently as far back into the nasal cavity as possible, then is withdrawn slowly to

permit of fractional radiation to the entire mucosae, since all the effective rays are emitted at the tip of the applicator. It is unreasonable to assume that the ultra violet rays intranasally will reach sinus disease. This cannot occur unless the sinus mucosa is directly exposed or unless the quartz applicator is inserted into the sinus cavity. However, the auxiliary use of ultra violet rays within the nasal cavity clears up localized infections resulting from the more or less constantly draining sinus openings in sinus disease and in primary nasal infections prevents the spread of the diseased process to the sinus mucosa by its dependable germicidal action. Duration of treatment at first lasts one minute to each nasal fossa; fractional irradiation, about fifteen seconds; this is increased one-half minute each subsequent treatment up to five to eight minutes, fractionally applied.

These applications should be accurately timed to avoid blistering of the mucus membranes. Following the exposure to both anterior cavities, the posterior nares and naso pharynx are thoroughly rayed, using a curved quartz rod designed for this purpose. This effort may start coughing or gagging, which can be obviated by applying topically a 2 per cent solution of novocaine about the uvula and nasopharyngeal wall, where there is a primary infection or where there has been an extension or complicating infection of the throat about the tonsillar and peritonsillar regions. These should be irradiated, using the Baldwin and Plank quartz applicators attached to a water-cooled lamp. Duration of treatment to the postnares, pharynx, larynx, tonsillar and peritonsillar regions is one minute at the onset, increasing one-half to one minute each subsequent treatment. It has been observed that the ultra violet radiations to be effectual in the treatment of throat infections should be used early, if possible, at the onset of symptoms, otherwise very little benefit can be accomplished. The ultra violet rays are considered to be the most dependable germicide at our disposal and have been reported as a successful treatment in clearing up diphtheria carriers. The ultra violet rays have been successful in the treatment of pyorrhoea, vincents angina and other infectious lesions of the gums, buccal cavity and throat. In the treatment of hay fever, the ultra violet rays are regarded to have a definite therapeutic and prophylactic value, when applied locally to the nose and throat and generally to the body. The technic of application of the ultra violet rays in hay fever is the same as for other infections of the nose and throat as already outlined, except that the doses should be more frequently repeated, especially if given during the attack. It has been observed that those cases having calcium deficiency always respond promptly to ultra violet radiations.

Galvanism is indicated in some chronic nasal conditions where the mucous membranes have an actual connective tissue infiltration. The most favorable action can be secured by zinc ionization in the

chronic hypertrophic rhinitis cases and adrenalin ionization in the simple chronic rhinitis cases, the main object being to shrink the dilated and congested blood vessels. The technic consists of packing the nose with long strips of gauze which have first been soaked with zinc sulphate solution—one grain to an ounce of water. The packing must cover as much of the nasal mucosa as possible. Only one side of the nose should be treated at a sitting. A flexible wire is attached to the rheophore leading from the positive pole of the galvanic apparatus and is inserted into the wet gauze and held in place by some cotton fixed snugly at the nasal opening. The indifferent or negative electrode is placed on the forearm or elsewhere. A current strength of about 6 to 10 M. A. is usually used but never stronger than the tolerance of patient will permit.

This procedure produces definite shrinkage of the turbinates and nasal mucosa, with resultant increase of space with improved ventilation and drainage and can be used to advantage prior to the application of intranasal diathermy and intranasal ultra violet radiation to permit easier insertion of the nasal electrode and quartz rod, which makes it an extremely valuable procedure in certain cases.

Diseases of the ears. Radiant light and heat and diathermy given singly or in combination are used for relief of catarrhal deafness and middle ear infections. The technic of the radiant light and heat exposure is the same as that outlined for acute nasal and sinus disease. Diathermy can be given through a double ear electrode made for that especial purpose or by metal plate electrodes about 2 x 3 inches in diameter and placed one in front of the affected ear and the other behind the opposite ear, giving a current strength to tolerance of the patient. Radiant light and heat energy is considered to be our most dependable agent for relief of discharging ears and should be directed over the ears, at a distance of about 23 to 30 inches, for 30 to 40 minutes' duration, using a 200 to 500 watt carbon filament bulb in any standard lamp applicator. The large type thermolites have been very effectively used for this purpose. Some excellent results have been achieved with zinc ionization of the ear canal given as described above for relief of chronic discharging ears following otitis media.

The electrothermic treatment of diseased tonsils is advocated in many cases but since time and space is limited, mention will be made only of the electro dessication method of treatment advocated and advised by Dr. Wm. L. Clark of Philadelphia. This method has been demonstrated to yield excellent results, in the sterilization and shrinkage or the complete removal of the tonsils. The electrothermic methods and radium are indicated in the treatment of cancerous and precancerous growths of the upper respiratory tract.

The essayist believes that much more can be accomplished by teamwork between the internist and physical therapist on the one

side and the otolaryngologist on the other than by either working alone. The former ordinarily should not be expected to be skilled in diagnosis of ear, nose and throat conditions, nor to remedy them by surgical operations when needed.

On the other hand, the busy specialist will seldom take time nor does he know the technic to administer to each patient the quantity and variety of the physical modalities necessary to successfully handle the indications. The combination of the treatments which are usually indicated in the physiotherapeutic treatment of the ear, nose and throat conditions requires from 40 minutes to 1 hour. The otologist, as a rule, does not care to devote the necessary time and trouble to master the art and details concerning the indications and technic of physical therapeutic measures and then apply them conscientiously to his patient. He will not logically be expected to achieve results or succeed in this work any more than he would in any other line of work so lightly considered.

On the other hand, the general medical man or physical therapist who attempts to treat patients with nose, ear and throat symptoms without making a careful examination or consultation with a competent otolaryngologist makes a great mistake, since he is working blindly and will probably overlook a mechanical or pyogenic condition which would never permit complete restoration of function, or complete symptomatic relief if not relieved.

In conjunction with the physical treatment there are at times indicated certain nasal medication, pneumatic suction, lavages, tamponing, etc. And all necessary nose and throat surgery is advocated to be performed as indicated in the judgment of the otolaryngologist, either before, during or after employing physical measures.

Conclusions:

1. Diathermy has been found to be the modality of choice in the treatment of nasal accessory sinus disease but should be combined with the other physical measures of adjuvantal value as described.

2. The proper selection and sequency of the physical modalities employed is of paramount importance in the treatment of diseases of the upper respiratory tract.

3. Exactness in the technic of application of the physical agents mentioned is essential for success.

4. Many favorable results have been achieved by the physical measures outlined in otherwise seemingly incurable conditions of the ear, nose and throat.

5. Best results are obtained when teamwork exists between the otolaryngologist and the physical therapist, each using the special methods which he has mastered to apply.

13 Pennington Street, Newark, N. J.

THE INFLUENCE AND THERAPEUTIC USE OF EXTERNAL HEAT*

PHYSIOLOGY AND USE IN INTERNAL MEDICINE
RALPH PEMBERTON, M.D.

USE IN NERVOUS DISEASES
THEODORE H. WEISENBURG, M.D.

USE IN SURGICAL AND ORTHOPEDIC CONDITIONS
A. BRUCE GILL, M.D.

USE IN DERMATOLOGY
JAY F. SCHAMBERG, M.D., PHILADELPHIA

PHYSIOLOGY AND USE OF HEAT IN INTERNAL MEDICINE

The use of external heat in the sense ordinarily understood by that term was a familiar therapeutic procedure to the ancients of Greece and Rome, who constructed elaborate establishments for the practice of hydrotherapy in various forms and also made use of naturally occurring thermal springs, such as those still frequented at Aix les Bains. Notwithstanding the application of heat to an increasing variety of conditions, the manner in which it accomplishes its purpose has been, until recently, poorly understood, chiefly owing to the fact that the actual conduct of most physical therapeutic measures has been in the hands of persons untrained in medicine.

One of the outstanding phenomena, obvious even to the layman, in the systemic application of external heat is the more or less profuse sweat induced. This occurrence has given rise to the popular idea of "elimination," which has found great favor with the laity and has even crept into medical writings in an uncritical way. The conception of what is eliminated has been vague, and small account has been taken of other and equally important changes induced. The last few years have been productive of new data, however, and, while much remains to be investigated, a fairly clear concept is now afforded of what occurs in the physiologic sense when the human body is exposed to heat.

The physiologic influence of external heat must be considered from the points of view of systemic and local exposure. The effects of systemic exposure will be discussed first, as they are necessary to an understanding of the subject as a whole.

Heat must be considered also, from the standpoint of its therapeutic use, under two general headings; viz., dry and wet. Dry heat includes exposure to the heat of the sun, to hot air and to heat radiated from heated articles, such as hot bricks and sand, electrical resistance coils, electric lamps and the actual cautery. Another form of exposure is afforded by "diathermy," but this will be considered elsewhere, since the heat in this instance is supposedly developed, not by an external object, but by the electrical resistance of the tissues themselves to a current passed through them. Consideration of heat from the sun involves other factors and will be taken up later under actinotherapy and radiation.

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Wet heat includes the hot bath, steam and mud baths, and the hot pack administered by means of wrapping the body in hot blankets or other coverings.

The penetration into the tissues of heat from the sources here considered, namely, heated objects, electric light bulbs, resistance coils or hot baths depends on the particular apparatus but is never great under therapeutic conditions. Following local exposure, there is directed to the part an increased circulation of blood which tends to keep the temperature of the tissue constant. The blood itself is also warmed but the heat-regulating mechanism of the body operates to maintain the temperature of the blood nearly constant in health, and it is therefore difficult or impossible to "heat up" deep lying structures by increasing the degree of heat or prolonging the application. However, superficial structures, such as the skin, tendons and fibrous tissue, are actually heated to a limited degree. In systemic exposure to heat, the penetration from the sources mentioned is the same, but bodily radiation obviously becomes inadequate eventually and an actual rise of body temperature as a whole results.

The effects of systemic exposure to dry and wet heat are much the same in principle and will therefore be discussed together, except when certain differences necessitate particularization.

One of the earliest effects to be noted after systemic exposure to heat is that on the circulation. Thus, the pulse rate rises more or less proportionately to the rise in body temperature[1] in the ratio of about ten beats for 1 degree F.,[2] much as it does in fever.

The effects on blood pressure, of external heat and cold, are somewhat varied.[3] Some observers believe that all baths at a temperature above or below that of the body raise blood pressure[4] but, in general, in normal persons warm baths probably tend to lower blood pressure and cold baths tend to raise it. There are some exceptions to this rule, and a bath 40 C. (104 F.) may give a blood pressure above normal, while a cold bath may occasionally induce a temporary fall in blood pressure preceded and followed by rise.[2] If exposure to external heat is in the form of a bath, there takes place, in addition, a diuresis dependent on the immersion of the abdomen in the water.

Systemic exposure to external heat generally produces a more or less well marked hyperpnea or over-ventilation of the lungs. This increases roughly parallel with the rise in body temperature, and water vapor is lost in large quantities through the expired air. Systemic exposure to heat in any form results, therefore, in a loss of

[1]Adolph, E. F., and Fulton, W. B.: Am. J. Physiol. 67: 573 (Feb.) 1924.
[2]Bazett, H. C.: Am. J. Physiol. 70: 412 (Oct.) 1924.
[3]Pemberton, Ralph: Ann. Clin. Med. 5: 763 (Feb.) 1927.
[4]Hinsdale: Hydrotherapy, Philadelphia, W. B. Saunders Company, 1910. Bazett (footnote 2).

fluid from the body through the lungs and sweat and, following baths, through the urine also. This causes a temporary loss of weight.[2] Following extreme sweating a slight concentration of the blood[5] tends to arise, but it is doubtful whether this takes place in any important degree under the usual conditions of clinical practice.[6]

Next to the kidneys the skin is, in man, the most important accessory channel for the elimination of water, and the salt excreted in the sweat may amount to ten times that normally present in the feces.[7] The sweat also contains, qualitatively, certain other substances occurring normally in the urine, such as urea, ammonia, uric acid, amino-acids, creatinine, phosphates and sulphates,[8] and it may also contain glucose. The elimination of these substances, especially water, salt and urea, forms the basis of the use of the sweat process in various forms of nephritis accompanied by edema or high blood urea nitrogen. There is large clinical support for belief in the value of this measure in nephritis, in which its influence is undoubted as regards salt and water. As regards the compensatory elimination of nitrogenous substances, there is some evidence to indicate it, but there are those who doubt "vicarious" excretion of nitrogen on the part of the sweat glands, and it seems that perspiration does not always lead to a decrease of urea in the urine.[8]

It is not generally appreciated that carbon dioxide a chief end-product of metabolism, escapes through the urine and sweat, as well as through the lungs, and one of the most fundamental effects of exposure to heat appears to depend somewhat on the increased loss of carbon dioxide through these three channels. As a result of the rise in the body temperature or hyperpyrexia, the general body metabolism is increased, and carbon dioxide is formed in quantities larger than normal. The overventilation through the lungs, however, washes out the carbon dioxide in even greater proportionate amounts, and part of the excess is furthermore lost through the urine and sweat. There also results from the heightened metabolism an increase in the phosphates and sulphates from the breakdown of protein, but these acid substances find their escape through the urine. In addition to the loss of all these substances, it has also been shown that the urine and the sweat contain fatty acids, including lactic acid, which are probably increased in amounts during exposure to external heat. The net result, therefore, of the loss of these various acid substances, chiefly carbon dioxide, is to leave a relative excess

[5]Flinn, F. B.: Am. J. Physiol. 70: 194 (Sept.) 1924. Gram: Exper. Biol. & Med. 21: 137, 1923. Barbour, H. G., Dawson, M. H., and Neuwirth, I.: Am. J. Physiol. 74: 204 (Sept.) 1925.

[6]Bazett (footnote 2). Cajori, F. A.: Crouter, Caroline Y., and Pemberton, Ralph: J. Biol. Chem. 57: 217 (Aug.) 1923.

[7]Myers in Barker: Endocrinology and Metabolism, New York. D. Appleton & Co. 3: 512, 1922.

[8]Von Noorden, quoted by Matill in Barker: Endocrinology and Metabolism 3: 867, 1922.

of alkali in the blood and probably in the tissues.[9] The blood becomes too alkaline, a systemic alkalosis results, and the excess of alkali is then eliminated through the urine and sweat until the normal acid-base equilibrium is restored. The urine and sweat thus generally change their reaction, becoming less acid, alkaline, or more alkaline. A sustained alkalosis may lead to tetany; it constitutes one of the sources of danger in the improper therapeutic use of external heat.[10]

A great loss of water and salt consequent on exposure to heat induces serious consequences unless this loss is partly compensated by ingestion. This loss may be one of the factors, together with the alkalosis referred to above, which induce the severe cramps in the muscles occasionally seen among stokers and other workers in extreme heat. In the clinical application of external heat, water is usually administered, but it is obvious that achievement of conditions that bring about sweating may be prevented or delayed unless the amounts and temperature of the water are considered.

The physiologic changes induced by local exposure of a part to heat are along the lines just described, but more intensive treatment is obviously possible because the process can be longer continued. Relaxation of tissues is induced, especially of the muscles, together with a hyperemia probably due to dilatation of blood vessels and a greater total blood flow in the area concerned. Local sweating also takes place, and the tissues are put in a condition to benefit more than they otherwise would by such measures as massage and passive motion or even active motion. If the local use of heat is continued too long, a systemic response may take place, dependent on a general hyperpyrexia, comparable to that following systemic exposure. This may be an advantage or disadvantage according to the conditions present, but must be considered in feeble patients or those already being exposed to systemic heat. The effects of heat locally will be further developed under the local use of heat in surgery.

FORMS OF APPLICATION

Dry Heat.—The various means and methods of applying physical therapy in almost any of its forms constitute specialties in themselves, and within the small compass of the present article only those features can be considered which are essential to a general understanding of the subject.

Apart from the familiar hot water bag, the most common mode of application of dry heat is that afforded by the electric light bulb. For local application, the apparatus usually takes the form of a parabolic mirror, suitably mounted, with the lamp at the focus so that the issuing rays are parallel. The apparatus can be held in the hand, or it is mounted on a stand and can be directed toward any

[9]Cajori, F. A.: Crouter, C. Y., and Pemberton, Ralph: The Alleged Role of Lactic Acid in Arthritis and Rheumatoid Conditions, Arch. Int. Med. 34: 566 (Oct.) 1924.
[10]Cajori, Crouter and Pemberton (footnote 6).

part. For more intensive local use a boxlike container, with or without an internal reflecting surface, open at the ends and equipped with light bulbs, is placed over the limb or part, with the patient in the sitting or reclining position.

For systemic exposure, lights are usually placed within a "cabinet" or large box containing a reflecting interior surface and large enough to allow the subject to sit on a chair, the head emerging through the doors or other covering at the top. The number of lights in such an apparatus may be from twenty to fifty or more, subject to control in small groups. For exposure in the recumbent position, the lights are placed within a troughlike semicircular container, also bearing a reflecting interior surface and about 5 feet in length. This is placed, with the concave side down, over the subject, whose head is allowed to emerge at one end. Blankets are placed over the whole, and drawn snugly around the neck and face in order to prevent undue radiation.

Dry heat is also administered in the form of hot air, but this usually requires elaborate equipment for the purpose of heating the air and is hardly available to the general practitioner, except in a few institutions. Electrical resistance coils placed within a boxlike container also afford a useful means of obtaining dry heat, especially for application to limited areas such as a knee or ankle. These various forms of apparatus can all be obtained on the market under various trade names, and they can be improvised at home with excellent results when necessity demands. Dry heat of lesser intensity can also be supplied for local purposes in the form of a resistance coil of flexible wires, properly insulated and covered with cloth, for such uses as those to which the familiar hot water bag is put.

One of the most important uses of dry heat in a local sense is that afforded by the actual cautery, which may be heated by flame or fire, as in the old days, or, more appropriately, by the electric current. The chief use of this is for destructive purposes in dermatologic conditions, including new growths, and will be discussed under that heading. The actual cautery has also long been used as a "counterirritant" in sciatica, though less so now than formerly. Probably some of its effects are due to the reaction from protein split products and the "shock" of the burn.

Wet Heat.—Probably the oldest form of the systemic application of heat is the hot bath. The presence of thermal springs scattered throughout the world has given rise to elaborate establishments for their utilization, but as far as heat per se is concerned almost equally satisfactory results can be obtained in many instances by the simplest forms of apparatus, such as the ordinary bath tub. The water used may be pure or it may contain various salts and other substances, such as magnesium sulphate or carbon dioxide, intended to increase or add to the effects. The temperature of the water varies, of course, according to the purpose of the bath, and

this question will be considered under therapeutic indications.

Next to the hot bath, the most frequently employed form of moist heat is that afforded by the so-called hot pack. This consists in principle in wrapping the body in a sheet or blanket made hot by being dipped in hot water of about 82 C (180F.), and subsequently wrung out more or less thoroughly. Obviously the severity of application will depend on the temperature of the enveloping sheet or blanket, and this effect will be further influenced by the number of blankets superimposed on the subject to prevent evaporation and cooling. Occasionally, the sheet or blanket placed on the body is below body temperature, constituting the "wet pack," under which circumstances the effect of heat is achieved through a conservation of the body heat by wrapping the subject with many blankets to prevent as much evaporation as possible.

Another form of exposure to moist heat is the steam bath, although this is by no means so widely employed as the hot water bath. A home-made apparatus can usually be "rigged up" in any household by means of large steam kettles, an oil lamp and a frame to elevate the bedclothes. The steam "room" has long been in use, and consists simply of a chamber into which steam under low pressure is allowed to escape. The disadvantages here are that the patient must breathe the hot moist air, and a better form of application is that in which the subject sits in a cabinet or lies in a sort of box with his head outside. There is some danger, however, in this procedure, as burns have occasionally been caused by faulty steam pipes or joints. In some instances, electric resistance coils supply steam under low pressure in a manner well adapted to this purpose.

The mud bath is an old form of application of moist heat but, in general, depends on the availability of certain soils, heated by thermal springs or artifically, and need hardly be considered at length here. The forms of wet heat that have been described are used chiefly for systemic treatment, but a useful local application of moist heat can also be made by means of the so-called whirlpool bath. This consists of a receptacle of suitable shape, usually deep and rather narrow, containing warm or hot water made to circulate rapidly by means of a laterally placed water jet. The part to be treated, usually an arm or a leg, is placed within the receptacle, and the temperature of the water is gradually raised to the desired point. The motion of the water intensifies the effect of the heat for any given temperature and has other advantages through its impingement on the tissues.

THERAPEUTIC INDICATIONS AND PRACTICE

The therapeutic indications for the use of external heat can be grouped under the two general headings of general exposure and local exposure, according to whether a systemic or a local effect is desired. Systemic effects find their application for the most part in

medical, as contrasted with surgical, conditions, and are valuable chiefly in the following disease states or syndromes: nephritis, acute or chronic; arthritis and rheumatoid conditions, in which either local or systemic heat or both may be used; and neurologic conditions, including neurasthenia, functional psychic disturbances and the true insanities.

The therapeutic indications for the use of heat locally are chiefly in the following fields: surgery, especially orthopedic, following fractures, dislocations, sprains, cicatrization after operative procedures and the like; arthritis, when a limited influence on a joint or joints is desired; and certain dermatologic conditions, in which a destructive influence is desired. Another disease state in which local heat has been alleged to have value is pneumonia. The form of heat known as diathermy has been advocated; but, for the reasons already given, discussion of this will be found under the heading of electrical procedures.

NEPHRITIS

There is probably no other condition in which the systemic use of external heat may have such specific early consequences as in nephritis. Whatever other pathologic manifestations may accompany nephritis, those which most imperatively demand treatment are dependent on the retention of toxic material, presumably of a nitrogenous nature, salt or water.

As already pointed out, some workers doubt the vicarious removal of nitrogenous substances through the skin, when elimination through the urine is reduced, but clinical experience is in favor of the view that something of this nature may occur. Furthermore, it is possible that some other toxic substances whose nature is not yet known may also be removed at the same time. It is well recognized, however, that the degree of toxicity does not run precisely parallel with the accumulation of nitrogenous substances. Thus, patients with uremia may show a disproportionately small rise in the urea nitrogen and, on the other hand, patients with marked increase in the urea nitrogen may present few or no clinical evidences of intoxication. It is safe to say, however, that in nephritic conditions accompanied by marked laboratory evidences of retention of nitrogen, or by clinical evidences which suggest the toxemia consequent on such retention, the sweating process is to be actively considered. The earlier symptoms of headache or nausea and even the later picture of coma or convulsions may apparently be benefited at times by sweating.

The argument has been advanced that, in the presence of toxemia from renal insufficiency and retained nitrogen, sweating serves only to concentrate the blood and to add to the danger from the retained substances.[11] There is some doubt as to the validity of this,

[11]Foster: Textbook of Medicine, edited by Cecil; Philadelphia, W. B. Saunders Company, 1927.

however, as the blood maintains its water balance with great tenacity, drawing on the tissues for this purpose, and the evidence is not final that under conditions of ordinary therapeutic procedure the blood undergoes any true concentration.[2] Furthermore, in the absence of inability to excrete water there would seem to be no objection to the administration of fluid to prevent concentration, as is indeed the practice in most hospitals. There is, furthermore, definite evidence that in conditions accompanied by retention of blood nitrogen the sweat may contain nitrogen in amounts larger than normal.[12]

Finally, it should be stated that the results believed to be achieved may be due to changes induced by heat in the blood flow; to an alteration of metabolism; or, in nephritis accompanied by acidosis, to the production of a systemic alkalosis as above described. Whatever the mechanism and whatever the difference of opinion as to the benefits obtained, however, it is probable that many experienced clinicians would be unwilling to withhold application of the sweat process in the toxic nephritis under discussion.

The other renal syndrome in which the sweat process has great value, and medical opinion is unanimous on this point, is that accompanied chiefly by retention of salt and water. While the bowels may be made to channel for elimination of water in large quantities, by hydragogue cathartics, water can also be eliminated in equal or even greater amounts through the sweat. Evidence has been presented that salt may be removed through the sweat channels in amounts equal to or larger than those occurring in the feces.

In the presence of edema or anasarca of renal origin, the hot pack or general body bake may have some of its most brilliant consequences, and the loss of fluid from the tissues may be obvious almost from the start. Usually, however, many treatments are required.

In all these conditions the physician must be guided by good judgment in the application and severity of the measures used. The guiding principle must be that benefit can be forthcoming only when the patient is in a position to withstand treatment of such severity and respond to it, and the physician must be on his guard lest contraindications appear, such as cardiac decompensation, circulatory collapse or high fever. It is sometimes necessary, however, to push treatment even in the presence of such contraindications.

The particular manner in which heat is systemically applied in nephritis is of secondary importance; but the simplest form, and one that can be carried out in any household, is the hot pack already briefly mentioned. This properly comes under the topic of hydrotherapy, however, and the further details of its application will be there discussed. It is of the highest importance that the proper

[12]Cajori, Crouter and Pemberton: Unpublished observations. Riggs: J. M. Research 24: 289, 1911.

technic be followed to insure results. A method requiring less labor is that afforded by the electric light "baker." The patient is enveloped snugly in a blanket, the electric light "baker" is placed over the body, with the exception of the head, and the various apertures of the appliance through which heat might escape are covered with several blankets, as is indeed the whole apparatus. The number of electric lights to be used must be determined by experience, and the current should be controlled by a switch on the outside of the "baker." A thermometer should be placed above the body of the patient, but under the covering blanket, and, in order that the temperature may be easily and frequently determined, it should be fastened to a cane or yardstick. A common mistake in this connection is to place the thermometer above the blanket exposed to the full influence of the lights, at which point it does not indicate properly the temperature to which the subject is actually exposed, and the process as a whole may be therefore unduly curtailed. The usual practice is to begin by elevating the temperature within the apparatus to 49 C. (120 F.) and to maintain this temperature for twenty minutes, after which the lights are turned off and the patient is allowed to remain wrapped in the blanket until he has cooled down to normal. The duration and temperature of the process must vary with circumstances, and it is always well, except in emergencies, to err on the conservative side especially at the outset. The body temperature may rise from 0.5 degrees to 1.5 degrees F. and it is customary to place an ice cap on the head and to administer water. Too much water, however, may prevent the degree of hyperpyrexia necessary to determine sweating, and it is also obvious that, in the presence of edema, ingestion of water may partly defeat the purpose in mind. Usually one glass of cool water during the bake is ample. It is sometimes advisable to include only part of the body, especially the loins, in the "bake," leaving the chest outside. Pulmonary edema has resulted from careless or undue application in severe nephritis.

Considerable prostration may occasionally follow the general procedure described; and, furthermore, although the effect of any one "bake" may be inappreciable, the effect of many treatments is sometimes cumulative. In few diseases is any single measure to be regarded as the only one to be relied on, and this is eminently true of the use of the sweat process in nephritis. The use of the skin as an emunctory organ must be accompanied by full use of the other channels, especially the bowels, and by such medication and control of protein, salt and fluid intake as modern conceptions of medicine require.

ARTHRITIS AND RHEUMATOID CONDITIONS

The field in which the application of external heat, both systemically and locally, has its most extensive and varied application is

probably that of arthritis and rheumatoid conditions. The full benefits to be derived from the systemic use of heat in this connection are, however, not always forthcoming from the heat alone, and sometimes depend on contrasting and accessory applications of cold. The latter phase of treatment constitutes an essential part of hydrotherapy, and the details of the conduction of this measure in its various forms will be considered in the section devoted to that topic. The matter will be discussed here sufficiently merely to indicate the general application of heat to the rheumatoid syndrome.

In view of the considerable confusion that still exists regarding the nomenclature and classification of the arthritides, as well as of the underlying pathologic changes concerned, there is no stereotyped guide to be followed in selecting cases appropriate for this treatment.

Those patients who are fairly robust afford the best opportunity for this practice. It is important to remember that systemic exposure to heat in any form may occasionally have distressing consequences, either immediately or after a course of treatment, and it is therefore essential to exercise caution in subjecting to such treatment those patients ill equipped to stand it. Those forms of arthritis which are thought, perhaps, to withstand such therapy best and to benefit most from it are cases of the degenerative or so-called hypertrophic type in middle aged, well nourished women, although the proliferative or so-called atrophic type may be equally helped. It must be pointed out here, as in connection with nephritis, that exposure to heat or hydrotherapy constitutes only one measure of treatment in the rheumatoid problem, and must not be followed except in correlation with other established principles of treatment. Especially is this true in relation to the important influence of focal infection. A patient with arthritis should not be subjected to the measure under discussion unless and until a complete medical examination has indicated the justification and indications for it. For generations the laity have frequented sanatoriums of all kinds where these measures have been applied in a wholesale way with the result that, although these measures have undoubted therapeutic value, failure and detriment have also followed.

As mentioned in the section on physiology, belief in the value of "elimination" in this disease has long been popular, but there is only limited evidence to support this as an important factor in itself. There is, however, definite evidence that some of the other effects achieved by exposure to heat play an important rôle in the treatment of arthritis. These effects are chiefly those arising from the heightened circulation and the increased metabolism induced. Evidence of changes in the circulation is to be seen in the obvious influence on the skin capillaries of the contrast baths or douches so successfully used in institutional treatment at the conclusion of the "bake" or hot bath. A true "metabolic whip" is afforded by cold water properly used.

The "bake" or bath may be given alone, however, in which case profuse sweating is induced and the subject is allowed to rest for an hour or more to compensate for the somewhat debilitating effects; or, more frequently, the exposure to heat is briefer and sufficient only to inaugurate or induce a mild diaphoresis. Following this procedure, which is generally administered with the patient in a sitting posture, a "tonic" shower or douche is given, beginning considerably above body temperature and shortly reduced to slightly below body temperature. This is best accomplished by an attendant who directs on the patient a jet of water, the temperature of which is under control. An exposure of about eight minutes to the electric cabinet "bake," followed by a so-called scotch douche or other form of cooling hydrotherapy, permits the subject to go at once out into the air with a sensation of exhilaration and well being instead of lassitude. There is also exercised at the same time an influence on the nervous system which, in the end, may be quieted by the process described, notwithstanding the apparent "shock" of the cool or cold water. Even persons of robust constitution should be subjected only gradually to these procedures; but by beginning cautiously even highly asthenic types can be educated to stand them and be benefited by them.

The sweating process alone, without the cooling contrast shower, is easier of attainment and can be brought about by means of the hot pack or hot bath in almost any household. In many instances the metabolic stimulus given by this single procedure is of great value and should be utilized when circumstances justify it. Some of the effects of cooling hydrotherapy can be achieved by means of the bed sponge or bath, but care must be used to avoid chilling. If the sweating process is prolonged and perspiration is profuse, the patient must rest for an hour or more before rising, or depletion and fatigue will result.

The general regimen briefly outlined can be carried out more or less successfully in the home, but the full achievement there of such results as follow the conduction of these measures by skilled hands in adequately equipped institutions can hardly be expected.

Much of the benefit of treatment at institutions is made possible by the incidental removal of the patient from causes of worry and fatigue, and to this can often be added the stimulus of new surroundings.

LOCAL APPLICATION OF HEAT IN ARTHRITIS

The application of external heat locally to a joint or joints in arthritis is often of the highest value. The principle obtains here, as elsewhere, that reliance must not be placed on this measure alone. It must be considered in conjunction with other principles of treatment of the disease as a whole, and the joint in particular. The measure most often used in conjunction with local external heat in

arthritis is massage and, although often misused at ignorant hands, it constitutes an almost necessary adjunct to the use of heat alone, especially in the form of effleurage. The forms of heat available for local use are discussed at the beginning of this article. The value of the heat can sometimes be enhanced by incorporating with it some other principle, as in the use of a hot saturated solution of magnesium sulphate applied to the affected part and kept hot by repeated application or a radiant lamp. This procedure sometimes greatly relieves pain. Application of heat should not be carried to the point of irritation and should depend for its effects on repeated use, once or twice a day, over a period varying from about ten minutes to half an hour. The temperature within the apparatus should not be above about 82 C. (180 F.), or the duration of treatment greater than twenty minutes at the outset. Temperature and length of exposure can be slowly increased. Local sweating generally occurs, and the part should be kept warm after the treatment. If a region such as the shoulder is baked for a long period, a systemic reaction may occur comparable to that following systemic exposure, the results of which may be depleting or otherwise undesirable.

THE USE OF HEAT IN DISEASES OF THE NERVOUS SYSTEM

Heat can be used to advantage in both organic and functional nervous diseases.

HEAT IN THE PSYCHOSES AND PSYCHONEUROSES

Heat can be used either systemically or locally. The value of the systemic use of heat is best demonstrated in the treatment of that type of psychosis in which there is present either a mania or an agitated depression. In both conditions the bodily activity is the result of the dysfunction of the mentality. In such patients, with active delusions and hallucinations, there is nothing that quiets them more than a so-called continuous hot bath. This is better called the continuous neutral bath, as the temperature generally averages around 36 C. (96 F.) and after the patient is immersed he experiences no sensation of either heat or cold. Such baths have been in use for years in well equipped hospitals for the insane. In consideration of the fact that even in general hospitals acute manic outbreaks are likely to occur from various causes, it would be well if most such institutions were so equipped.

The equipment and the method of handling the patients are as follows: Large tubs are used of sufficient length to accommodate the patient comfortably. They are frequently equipped with canvas slings which can be used to keep the patient from contact with the bottom of the tub. The temperature is controlled by a mixer which regulates the temperature of the water. The attendant, however, must always use a bath thermometer as a check on the thermometer in the mixer. Patients are kept in the continuous bath for various

periods of time depending on their condition. No clothing is worn. The soles of the feet and the palms of the hands are well greased before the patient gets into the tub. Many patients receive their meals while in the water, sleep there, and may be kept there for days at a time. The continuous bath offers a means of inducing sedation which is unparalleled so far as physical measures are concerned. The effects are sometimes very striking. Excited mental cases and pure nervous cases, such as chorea, are controlled by this means much more rapidly than by the use of drugs. In all cases it is imperative that some one familiar with this type of physical therapy be in constant attendance to prevent accidents and to make sure that the temperature of the water is kept at the desired point.

In case the equipment for continuous baths is not present, hot tub baths can be used. Cold packs, next to continuous hot baths, quiet active patients perhaps better than anything else.

Cold packs are given in the following manner: The full length of a mattress is covered by a rubber sheet, over which are placed two or three wool blankets. A sheet is rung out in cold tap water and spread over the topmost blanket and the patient laid on it. The sheet is wrapped about the patient and folded over the feet and about the shoulders. The topmost blanket is brought up over the patient and another blanket is spread over him and tucked beneath him. The second lower blanket is folded over the patient and another one spread over him and tucked beneath him. The third or greater number of blankets is folded about the patient in this manner. An ice bag is placed on the patient's head, which is supported by a small pillow. The patient is allowed to remain in the pack until, following the "reaction" and the conservation of body heat, he begins to perspire freely and sometimes for a considerable period after that depending on his condition. Cold packs offer a very effectual means of restraint in excited cases, as well as produce a marked sedative and therapeutic action. Cold packs are seldom used in the presence of circulatory or cardiac derangement or with patients in much weakened states; herein lie the contraindications to their use.

The systemic use of physical therapy in the treatment of psychoneuroses had its inception under the direction of Dr. S. Weir Mitchell. In the so-called rest cure, named after him, the use of electric light baths, combined with hydrotherapy, massage and moderate exercise, is of great benefit. The same causes which operate in the production of the arthritides, for example, in one patient, may produce a neurosis in another; therefore the physician should be guided by the same general outlook already referred to and by a balanced conception of therapy.

In the psychoneuroses the so-called tonic electric bakes, given every day and followed by hot and cold contrast showers, afford a great stimulus to the patient. Hydrotherapy in the form of hot and

cold showers alone can be given daily. The method of application of these procedures has been already commented on under the subheading "Arthritic and Rheumatoid Conditions," but it must be again emphasized here that electric "baking" with hydrotherapy is only a part of the general treatment and dependence on it alone will not gain very much.

ORGANIC NERVOUS DISEASES

Heat is of the greatest value in inflammations of the peripheral nerves and in vascular diseases in which the nervous system is implicated. In the various neuritides, such as intercostal neuralgia or inflammation of any of the nerves in the limbs, heat, and particularly dry heat, allays the inflammation. In intercostal neuralgia, care must be taken to give a sufficient amount of treatment, for the penetration here must be deeper than in the limbs. Here heat is only one mode of treatment, as frequently a neuritic condition is part of an arthritis, and electrical treatment, principally in the form of diathermy, will be much more efficacious.

In certain vascular diseases of the limbs, such as erythromelalgia, Raynaud's disease, thrombo-angiitis obliterans, thrombophlebitis and endarteritis obliterans, dry heat applied to the diseased parts more or less constantly over a period of days may cause an alleviation of the symptoms. It is not a cure and is only a means of alleviation of pain. The modern operation of sympathectomy offers much more hope of permanent relief.

Even in chronic diseases of the nervous system, such as hemiplegia or lateral sclerosis, when the limbs are spastic, heat will decrease the spasms and contractures, at least for a time, and will moderate other symptoms.

HEAT IN SURGICAL AND ORTHOPEDIC CONDITIONS

As has been pointed out, local application of heat produces relaxation of the tissues, particularly of the voluntary and involuntary muscle fibers. Spasm of the skeletal muscles is relieved, the walls of the smaller arteries seem to relax, and the vessels dilate. By reason of these conditions, a greater amount of arterial blood flows to the part, bringing oxygen and nutriment. Furthermore, the increased blood flow induced on the venous side carries away in larger degree the products of normal or abnormal metabolism, so that they do not remain as local poisons or irritants but are excreted from the body through natural channels.

Numerous conditions occur in various parts of the body in which normal physiologic activity or metabolism is interfered with, as a result of local injury or disease or even as a part of a general "slowing of metabolism" throughout the entire body. If metabolism of the tissues locally becomes permanently lowered, the function of the member or part of the body becomes impaired. With lessened gross mechanical function of the part there is lessened chemical or meta-

bolic activity, because motion or function is a prime factor in the flow of the blood and in the oxidation of the tissues. Thus, a vicious circle may become established.

As a result of local injury there may be hemorrhage, exudation, effusion, swelling, increased pressure or tension and pain. The increased tension narrows the lumen of the veins or completely occludes them and blocks the flow in the lymphatics. Greater swelling, even of distal parts, results. Possibly, as a result of the blocking of venous flow, capillary tension becomes so increased that the capillaries rupture. Anemia and even death of tissues may ensue. Later scar tissue forms, and as it contracts it constricts blood vessels and interferes with function of nerves. This grossly disturbs the mechanical function of the member by limiting or abolishing the motion of muscles and their tendons and of joints, through fibrosis of ligaments and capsule, or by adhesions within the joint.

Immediately following an injury, there is an inflammatory reaction with heightened local metabolism and elevation of temperature. This condition is usually treated by rest, elevation, and the application of cooling lotions. But the succeeding subacute and chronic stages with swelling, sluggishness, anemia and lowering of metabolism are to be treated by the application of heat, massage, and passive and active motions carried out in a manner to avoid repetition of traumatism of the structures already injured. To speed up a "lowered local metabolism," to remove the products of hemorrhage and exudates into the tissues, or effusions into the joints, and to restore chemical and mechanical function, are the objects of treatment.

In the following conditions, the application of heat, accompanied later by massage, may be of value. It must be emphasized that the use of heat in surgical conditions is not to be considered alone but only in connection with general surgical principles; and that its benefits are often obtainable only by the coincident use of massage, for which it paves the way.

TRAUMATIC CONDITIONS

1. *Fractures.*—A simple fracture of the shaft of a long bone, not involving a joint or near a joint and not complicated by a marked or persistent swelling at the site of the fracture or of the extremity distal to the fracture, may not require this form of treatment. But fractures into or about the joints, such as Colles' fracture or Pott's fracture, accompanied by swelling at the site of the fracture and particularly by swelling of the hand or foot, are best treated by baking followed by massage. This treatment should be begun within a few days after reduction of the fracture.

Care must be taken not to displace the fragments during the treatment. It is of the utmost importance to prevent fibrous ankylosis of the fingers, which is caused in large part or altogether by

persistent swelling of the hand. Such persistent swelling of the hand may occur as a result of any severe traumatism to the upper extremity, whether a fracture or a dislocation. It is to be combated by attention to the dressing to prevent interference with the circulation, by elevation of the hand, by persistent active movement of the fingers, and by baking and massage.

Function of the joints of both the upper and lower extremities should never be lost sight of in dealing with any fracture of the extremities. Baking, massage and passive and active movements are the chief available means for the maintenance or restoration of normal motion. Treatment should be continued as long as swelling and limitation of motion persist, or as long as there is tenderness at the site of the fracture.

2. *Sprains and Dislocations.*—Treatment is similar to that of fractures near joints as just described. Splints or casts should be removed and replaced again after the daily treatment by baking and massage. On the whole, fixation by a removable plaster splint and daily baking and massage are to be preferred to strapping with adhesive plaster, which does not permit of physical therapy.

3. *Traumatic Synovitis.*—After the first stage of acute inflammation lasting from one day to possibly a week, the secondary stage of absorption of effusion and restoration of function of the joint begins. During this stage, baking and massage are vitally important in aiding these processes.

4. *Contusions and Muscle Sprains.*—Similar means of treatment are valuable also in these conditions to secure absorption of the products of hemorrhage, to eliminate swelling and pain, and to secure restoration of function. Collections of blood, if not absorbed, may form cysts or may be infected through the blood stream and become abscesses. The development of such abscesses after local injury is not uncommon. It is of importance to secure as early absorption of blood clots as possible. Treatment should be continued as long as tenderness in the injured part persists.

5. *Bursitis.*—This condition, often seen about the elbow and shoulder joints, for example, and resulting from acute or chronic strain, is susceptible to improvement or cure by baking and massage.

INFLAMMATORY CONDITIONS

During the acute stage of inflammatory conditions of joints and bursae, the application of heat may be more harmful than beneficial, although acute bursitis may be favorably influenced by diathermy. The duration of the primary stage depends largely, of course, on the kind and the virulence of any infection which may be present. An infection of a joint may produce a simple synovitis, a plastic arthritis or a severe purulent arthritis and the course and duration of the disease may vary greatly. In general, it may be said that for these

conditions baking and massage are to be begun after the acute inflammatory reaction has disappeared. The object of the treatment is first to remove the products of inflammation, such as effusion into the joint or exudate in the tissues about it; secondly, to aid in the removal of fibrous tissue formation, which limits joint motion; and, finally, to loosen all muscles or tendons which normally move the joint and are bound by adhesions within the sheath, outside the sheath or in the bursae. Even in fairly severe cases of fibrous ankylosis, some benefit is to be obtained by this method of treatment, while in the milder cases even complete restoration of function in the joint may be expected. Before performing any operation on or about such a joint, the surgeon should employ baking and massage persistently and faithfully for some weeks or months to secure as much improvement as possible.

In the condition of flatfoot due to traumatism, or possibly to infection, semirigid and spastic feet can frequently be made more flexible by these means of physical therapy, in conjunction with the use of proper supports for the feet.

CHRONIC BACKACHE

A complete discussion of chronic backache would occupy many pages. There are probably many causes for chronic backache and the treatment must vary according to the etiology, but by far the largest percentage of cases is probably due to muscle and ligamentous strain, either arising acutely from some traumatism or occurring slowly from a chronic strain, such as that due to bad posture. The site of the trouble may be about the lumbosacral joint or occasionally in the sacro-iliac joint, but it is most commonly observed in the lumbar region of the back, where the joints of tenderness are found to be at the tips of the lumbar transverse processes where the lumbar muscles, particularly the quadratus lumborum, are attached. This condition can be profitably treated by baking and massage, by proper means of support for the muscles and ligaments which are under strain, and by properly graded exercises to strengthen the muscles and to improve posture. Acute attacks of what might be called myositis or lumbago are also advantageously treated by baking and massage, by a support, or by complete rest in bed for the time being.

METHODS OF APPLICATION OF HEAT

Heat may be applied by means of hot fomentations or by the use of hot water bottles and electric pads, but the best means of application is by baking the part. Various types of apparatus may be used, such as the baker which contains numerous electric light bulbs, or an electric or gas baker. The temperature in the baker may be raised to a point between 94 and 205 C. (200 and 400 F.). The higher the temperature employed, the greater care must be used to keep the skin covered with layers of flannel or woolen blankets to

avoid blistering. The length of each treatment is usually about one-half hour. Following the baking a thorough massage should be given. The parts should then be kept warm and not cooled off rapidly by going out into the cold immediately after treatment.

HEAT IN DERMATOLOGY

Heat has an effective therapeutic value in the destruction of neoplasms on the surface of the skin and in accessible mucous cavities and, more exceptionally, in the treatment of larger malignant tumors to which the knife was formerly exclusively applied.

Heat may be developed externally in a wire or other metallic electrode, or it may be developed in living tissues through the body resistance.

It is an elementary electrokinetic principle that the heat developed in a conductor is proportional to the product of the resistance of the conductor, the square of the current, and the time. The temperature developed will depend, however, on many other factors, such as the specified heat of the tissues and the heat losses due to conduction to surrounding tissues, especially by the blood stream and by radiation at the surfaces.

Heat may also be developed by other means than electricity, as is exemplified in the hot iron used in early days, or in the more refined and more readily controlled Paquelin cautery. The latter is comparable in effect with the electrocautery.

The electrocautery is a valuable method in the treatment of small cutaneous growths, such as keratoses, moles pigmented and otherwise, warts, and small epitheliomas. With platinum-iridium electrodes of different sizes and shapes, rendered incandescent by the passage of electricity, small growths can be removed with little or no resultant scarring. The degree of destruction of tissue can thus perhaps be more readily predetermined by those with relatively little experience than with the use of methods presently to be discussed. Owing to carbonization, the heat does not reach great depth.

ELECTRODESICCATION

Electrodesiccation is a term applied to the generation of heat in the body tissues from the application of a high frequency current of the Oudin type to the surface of the body. This method was first introduced by Pozzi of Paris in 1907, and improved by Doyen, a fellow countryman. W. L. Clark of Philadelphia is to be credited with further technical improvements. The application is usually made with a unipolar single electrode current, the heat being concentrated on the surface tissue by an arc from a metallic electrode. A fine needle, such as is used for ordinary sewing, or a pointed wire (copper, steel or other metal), is used and the air arc is usually only a few millimeters in length. The tissue treated becomes grayish white and is dehydrated—hence the name. In some cases the needle

is brought just in contact with the surface, or the needle may be inserted into the tissues more or less deeply, depending on the degree of destruction desired. The Oudin current is of relatively high voltage and of low amperage.

The apparatus now available for this treatment is sufficiently controllable so that any range of current strength from an almost invisible spark to a heavy flaming one can be obtained.

This method of treatment is particularly applicable to benign growths of the larynx, bladder and rectum, and to such conditions as pterygium, trachoma, moles, keratoses, papillomas, small epitheliomas of the skin, and leukokeratosis of the mouth.

ELECTROCOAGULATION

The term electrocoagulation should be distinguished from electrodesiccation, for the technic and the effects are different. Electrocoagulation is produced by a bipolar high frequency current of the d'Arsonval type. The current used will vary, according to the destruction desired, between 200 and 2,500 milliamperes. The current is much more intense than that generated in electrodesiccation. A current of higher amperage is used.

A cambric needle is employed as in desiccation. For use in cavities such as the mouth, rectum or vagina, a long needle or a pointed wire covered with rubber insulation to within one-half inch of the tip is employed. The inactive electrode consists of a metal plate or a specially constructed moist pad about 8 by 12 inches in diameter, placed under the back or the buttocks. It should be carefully molded to the form to prevent sparking and a consequent burn at the point of unequal contact. The metal parts, in the case of the moist electrode, are covered with several layers of gauze or, better, asbestos paper covered with a linen cloth. The entire pad is moistened and placed in a moistened pillow case. The back of the patient should be insulated by rubber sheeting from the operating table, which for some types of apparatus should be made entirely of wood.

The needle is inserted into the tissue after a preliminary testing of the strength on a piece of metal. In treating large growths, a line of coagulation, evidenced by whitening of the tissue, should be thrown around and beneath the growth to prevent lymph and blood metastasis. After destruction, the tumor should be curetted away.

Experience alone will enable one to judge how far destruction should be carried. This usually goes beyond the area of white coagulation, and care must therefore be exercised or else excessive sloughing may take place.

Electrocoagulation is of superior value in the treatment of accessible malignant growths. Its advantage over the knife in many conditions is that it seals the lymph and blood channels and thus prevents the migration of cancer cells. In cancer of the tongue,

for instance, it is distinctly superior to surgical ablation. By the use of this method, fortified by the employment of radium or roentgen rays, decidedly better results are being achieved. According to Clark and his associates, electrodesiccation produces under the microscope dehydration and desiccation of epithelial cells with consequent shrinking. Electrocoagulation produces an actual coagulation of the tissue proteins into a homogeneous cell mass.

TREATMENT BY REFRIGERATION

Liquid Air.—This substance has been used in the treatment of certain diseases of the skin. The difficulty of obtaining and, more particularly, of preserving it has greatly restricted its use.

Carbon Dioxide.—Solid carbon dioxide was introduced by Pusey of Chicago as a substitute for liquid air in the treatment of diseases of the skin.

Refrigeration of the skin with carbon dioxide produces an inflammatory action varying in intensity according to the duration of contact of the freezing agent and the degree of pressure employed. The resulting traumatism may vary from an evanescent inflammatory reaction to necrosis of the tissue treated. The degree of pressure exerted determines the depth of the freezing. The most important factor in inducing the tissue changes is the duration of the refrigeration. The usual period of application is from ten to forty-five seconds.

This treatment gives beautiful results in raised angiomas of moderate size, but does little good in "port wine" stains. It is also valuable in hypertrophic nevi, in keratoses, and in the quiescent stage of lupus erythematosus. The carbon dioxide pencil is formed from the rapidly freezing gas permitted to escape in a glove-finger or similar device from a cylinder of carbon dioxide gas.

PHYSIOTHERAPY IN BUSINESS

By AGNES E. SUSSDORF

Read before the Sixth Annual Convention of the American Physiotherapy Association

In the executive offices of a large industrial company, the indication for physiotherapy are necessarily fewer than at that same company's plants. For here one deals with business men and women, who, while they may be working under pressure from some injury or disease, are yet putting in a full day's work. The possibilities for physiotherapy in the business field are becoming better recognized and developed as a measure for relief from this pressure with a corresponding increase in business efficiency. The aim here is to *keep* the employe well instead of to *get* him well, but where disease and injury cannot be avoided, to provide him the means of regaining health quickly, with as little loss of time as possible, to the mutual benefit of himself and the organization.

To realize this aim, there must be not only an adequate dispensary, but there must exist or be created a real cooperation between the patient, his employer and those in charge of the medical or welfare work as it is called, and we hope more appropriately in our company, for we do not require periodic examinations as do some business concerns. We are very fortunate in having not only a group of executives who sponsor this work by giving us free rein in the matter of equipment, but in having for the immediate head of this department a man who is not only keenly alive in all phases in the development of health and safety, both at the plants and at our home offices, but who is especially interested in physiotherapy and is substituting it for medicine wherever practicable.

Through his efforts, the heads of the various departments have become interested in his plans not only for their own well-being but for that of their employes', so that they encourage them to come to us at the onset of any adverse symptoms, though there are still a few who need education in the matter of sparing their subordinates the time for treatment. Perhaps the biggest psychological problem we have to solve is gaining the confidence of the patient himself. His employer may urge his coming for treatment, but he may hesitate for one or two principal reasons: either he fears physiotherapy because it is new to him or he is afraid our services will prove valueless because free. But a satisfied patient is our best advertisement; news travels fast and the number of those we reach is steadily growing. Then, too, we keep getting recruits, including some of the officials of the company, from among those who have been receiving physiotherapy from their own physicians, but who are also glad to make a saving here when convinced that they will receive the same treatment.

Another problem which is of real concern in most hospital or institutional reconstruction, the old question of end results, is practically eliminated with us. We treat our patients until we have done everything indicated and then discharge them with the understanding that they will return to us with any recurrent symptoms, and with the knowledge that we can check up on them at any time it may seem advisable. On the other hand, we try to discourage malingering and really find this question also to be no source of worry, due to the fact that they are kept fairly busy, and in part no doubt to the fact that we have so few serious and chronic cases with which to deal.

When the dispensary for the New York offices of the American Car and Foundry Company was opened about five years ago, there were no physiotherapy treatments except radiant heat from a thermolite or large cabinet baker, and I suspect the latter was used more for aesthetic than therapeutic reasons. Simultaneously with my taking care of this dispensary 2½ years ago, a high frequency machine was installed, and a few months later a combination air and water-cooled U.V.R. lamp. When we moved to our new offices a year ago, the cabinet baker was sent up to the Memorial Hospital and we substituted a D. T. lamp. The latest P. T. installation has been a vita-glass window, but for the president's office, so that its use will of course be limited. But before the plans for our new offices were completed, I was sent around to inspect some dozen or so of the other downtown dispensaries to get suggestions for arrangement or additional equipment. I heartily recommend that you at some time visit the medical departments of the Metropolitan Life Insurance, the American Telephone and Telegraph Co., and the Federal Reserve Bank, especially the latter, for it is the most spacious department you could imagine, with its wide gray marble corridors, magnificently appointed down to each small detail, while its trim-barred windows, grilled doors and heavily armed guards invest it with a most unique atmosphere.

Of the 500 or more employes in our company, about 75 per cent have been treated at the dispensary, either by the physician in charge, who is there two hours a day, or by myself. More than half of the treatments I have given have been physiotherapy, prescribed, of course, by the doctor, but with the understanding that if a change seems advisable it may be made.

High frequency treatments head the list in point of number, though we give very little direct diathermia. Occasionally we have a fracture or sprain or an arthritic joint to treat, but orthopedic injuries are few in proportion to other conditions where you are dealing with an office force. Bronchitis is very common and is treated with very good results, usually three or four treatments being sufficient to clear up an acute attack. Modified diathermy we use to some extent for sprains of the back, sciatica and sinusitis, and sometimes for severe headache. But the type of H. F. treat-

ment most often given is with the anti-condensation pad and handle. Many of our employes, especially the girls, suffer from neuritis, insomnia and general circulatory disturbances due to the abnormal tension under which they live and work in the city, and their general sedentary habits, and we find that this treatment affords quite a bit of relief to those who are of a high strung and nervous temperament. We have had no noticeable success in the reduction of high blood pressure by this method, though it does relieve attendant distress.

The Deep Therapy Lamp we use somewhat for lumbago, arthritis and neuritis, an occasional sprain or contusion, but find it most valuable in relieving sinus conditions, heavy chest colds, and the soreness and stiffness of neck which follow the red-throat type of flu so prevalent this winter. An acute attack of torticollis, however, we usually treat with thermolite and massage.

U. V. R. from the water-cooled lamp we give now and then for patchy skin disease, but more especially for rhinitis and sinus infections, where we combine it with modified diathermy, according to the technique developed by Dr. Brooke of the Veteran's Bureau, with excellent results. U. V. R. from the air-cooled lamp, as you can imagine, is more often indicated. Patients may come to us in a general run-down anemic condition, suffering perhaps from insomnia, loss of appetite and weight, or we may get those who are recovering from some serious operation or disease who need the tonic effects of the sunlight. Girls who have had considerable distress at period times have reported less pain following U. V. R. treatments. It is rarely that we find a general skin condition to clear up, though in many cases of general debility it is not uncommon to discover a rash which resembles those we used to come across in the service following nerve injuries. Now and then we have a case of poisoning from carbon paper or other dyes, which respond very favorably to U. V. R., as have also a few very interesting cases of T. B. glands.

We have not found it necessary to install hydrotherapy, though occasionally we give hot or cold applications, and very little massage is indicated. Nor have we found it worth while to add any X-ray, galvanic or static machinery, because our affiliation with the Beekman St. Hospital gives us the privilege of referring to it any employe to whom we cannot render adequate service through limited equipment.

On the whole, we feel that our work progresses with very little friction, and that it justifies itself, both from the humanitarian standpoint, and that of business efficiency. Results are most spectacular, because we have so few serious injuries or diseases to deal with. But we are content to nip trouble in the bud where possible, and thus perhaps get a little nearer to the final goal of all medicine—the only one, some physicians declare, though it thereby cut their own throats—the goal of ultimate prevention.

301 West 22nd Street, New York City.

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EDITORIALS

THE REVIEW wishes every one a Merry Christmas and a Happy New Year. Three hundred sixty-five—no, 1928 is Leap Year—three hundred sixty-six days of health, happiness and prosperity. Christmas or New Years' day is not enough for well wishing and well being—it must flow out into the other days, brushing elbows with the work-a-day world. In human contacts the course should be so charted that "we shall not fail to live profitably." The Christmas spirit which lies behind the hectic rush of these last shopping days denotes a spiritual festival and "implies belief and reliance on things not made by hands". . . Nor will our job suffer from such.

Physiotherapists: Registry maintained by the American Physiotherapy Association for members will supply highly trained, experienced or recently graduated physiotherapists for institutional or office positions. Apply to Grace Courter, Director of Vocational Bureau, Garfield Memorial Hospital, Washington, D. C.

ATTENTION!—At last the emblems for the arm bands are ready. They may be ordered from William Filene's Sons Co., Boston, Mass. They are sixty cents (.60) each. BUT FIRST——you must write to the treasurer to get your purchase card, if you have paid your dues. Filene's have had instructions not to sell emblems to any one without this card. This is to avoid the possibility of others than members of the A. P. A. getting the emblems. They are made up in pretty blue and gold on a white background. Good Christmas suggestion.

Love Song of the Volt

Come, my Ampere, let us wander
Down the 60 cycle line;
We will build our love nest yonder
In the rectifier's brine.
Or if you prefer detectors,
We will oscillate that way
Past the realm of wave selectors,
Hand in hand—watt do you say?

Gliding past the horsepower motors,
Slipping past condensors, too,
Dancing by the whirling rotors,
Lighting audion bulbs anew—
Dear, our love will be POTENTIAL,
You're A. C.* as were you ever;
To my life you are essential,
Our CONNECTION none shall sever!

Is our love then ALTERNATING?
Do you hold me at a distance?
Why the constant vacillating?
Why do you put up RESISTANCE?
Come and give yourself to me, dear,
Where we—Hark! What's that I see, dear,
We will build our cosy home
Quick! let's fly! Here comes an ohm!

*As cute.

OCCUPATIONAL THERAPY

By CAROLINE N. SHAW

Presented to the Massachusetts Physiotherapy Association, Inc.

It is a pleasure tonight to speak to a group to whom the words *Occupational Therapy* mean something besides a new term in a crossword puzzle or the dictionary. But even to each one of you, the words may have a different shade of meaning and so I have been asked to explain briefly a little about some of the occupational therapy work which is being done, especially in the clinic of the Boston School of Occupational Therapy.

But at first I do want you to go a bit farther afield with me. Since occupational therapy does mean everything, from tatting to kiddie cars, perhaps I may be pardoned for giving you a definition of it—one which Dr. Pattison of the Potts Memorial Hospital, Livingston, N. Y., has given us. "Occupational therapy may be defined as any activity, mental or physical, definitely prescribed and guided, for the distinct purpose of contributing to and hastening the recovery from disease or injury."

In spite of the fact that an insurance agent's jaw drops when he receives the answer to his question, "What do you do?" and your answer is, "I am an occupational therapist," occupational therapy is really nothing new, merely new in its method of application. It began in the 16th century in mental hospitals, but not under that name. It was simply a recognition on the part of a progressive doctor or nurse that a patient was better when employed with normal activities.

In 1798, Dr. Benjamin Rush proposed "certain employment to be desired for such of the deranged people as are capable of working —spinning, sewing, churning might be desired for women; turning a wheel, particularly grinding Indian corn in a handmill for food for horses or cows, cutting straw, weaving, digging in a garden, sawing or planing boards, etc., would be useful for men." (Archives, Vol. 4, No. 2, p. 83.)

Someone has remarked that a wheelbarrow was the best O. T. tool he knew of.

In 1810, Dr. Rush instanced experience in foreign hospitals which showed that those patients who did the ordinary work of the place had more recoveries among them than those who were elevated by their rank in life above the obligations and necessities of labor. (Article, "Development of O. T. in Private Hospitals for Mental and Nervous Diseases," by Earl Bond.)

And again in 1841, Dr. Kirkbride writes, "The importance of furnishing the insane with suitable means of employment and amusement is now so well understood that we shall merely indicate those to which our patients have resorted during the past year."

Even as in days gone by, the mental field is still our largest

field. In New York State hospitals for the insane, elaborate plans for the life of the patient have been worked out and all except the strictly medical and nursing care come under the supervision of the director of occupational therapy.

During the war the doctors began to discover the benefits which functional cases derived from the use of occupational therapy. Given to a wounded man first to amuse him, it was seen that he recovered the use of an injured joint more quickly and more completely because of the O. T. work he had done. So when they called for more and more aides, schools were started to meet the demand.

When these same doctors returned to America, they wanted patients at home to benefit in a similar way, so that since war days the orthopedic demand for occupational therapy has developed.

Mental, orthopedic, tuberculosis and general hospitals are now using occupational therapy—less in the general hospitals because of the more acute cases handled there and the shorter stay of the patients.

In Bellevue Hospital, New York, which is an acute hospital, patients pushed through the wards and out are directed to the O. T. shop, under prescription, to hasten their return to industry. One service of the four surgical services used it, and after one year was so pleased with results on functional cases that the chief requested an occupational therapy demonstration for the benefit of the doctors of the other three groups.

Perhaps if some of you haven't seen much of O. T. since army days, you may not realize that it is really less occupational and more therapeutic than at that time; that we as therapists are working just as much under doctors' orders and on medical prescriptions as are you physiotherapists. We do not conflict with or duplicate your work as physiotherapists. We do no passive work with our patients. We give no baking, no massage nor manipulation. In our treatment, the patient must do all the work himself. A functional case may feel pain and stiffness a long time, may feel he needs physiotherapy for weeks on end. When he begins occupational therapy, the active test is applied. It is proven just how far his limitation keeps him from using the injured part.

There is need for us both so to dovetail our work that we may find just the point where one stops and the other begins, or where we get best results working together. That, to my mind, should be the doctor's decision, also in which type of case one of us is needed more than the other.

You are far more valuable to the infantile case than are we. Our work is more with muscle groups—not as fine distinctions as yours. With the patient doing the work all himself, it is bound to be so.

We may teach a patient a craft to increase the flexion of his

elbow but unless we trespass on the passive side, he is bound to extend that elbow in order to flex it again. That is where some of you feel that our work is unwise. But when we rightly plan it so that the strength (if it is muscle development needed) is demanded of the flexors, it probably will not over-develop those extensors.

You as physiotherapists get the patient's muscles or joints ready for us to take him on and give him some craft to do by which he will make the effort to create something and use that injured part far more than with a set of exercises done so many times each day.

The very reason that the mental field is the largest is the same reason that occupational therapy is very successful with other types of cases—functional, for example. In his interest in what he sees growing under his touch, the patient forgets that he is using muscles and joints which he felt sure he could not use. The tediousness of an exercise disappears, but the benefit of that exercise results to an even greater degree.

In order that the students at the B. S. O. T. may have more opportunity to stress the medical side, the school maintains a clinical department, really as a laboratory, so that before the student even goes to a hospital for her field work, she may see patients at work, may deal a bit with them, may visualize the practical application of some of her theoretical work. For the patient it is one step—the first of three possible steps—in rehabilitation outside of the hospital walls. Those three are:

1. The occupational therapy clinic.
2. The sheltered workshop—a commercial pre-industrial work under medical supervision.
3. Vocational or industrial training—reeducation.

The second two (repeat) are often confused with our work. For that very reason we call ourselves the Clinical Department of the school—the clinic, not the workshop—for to so many that connotes something commercial. Ours is medical work. It is the first step after the hospital or in convalescence.

Many patients leave the hospitals, or are otherwise under the doctor's care, who can definitely be helped back to health and normal activity by means of supervised craft work. The crafts are simply our medicine kit, our means to an end—that end, or goal, definitely indicated by the physician in charge of the case.

As crafts for crafts' sake we care nothing about them. As crafts for a commercial end we care nothing about them.

I recall the case of an Italian woman in a mental hospital. She was extremely disturbed, raved and walked constantly. She did exquisite Italian embroidery as she walked but never would she stay quiet. A new therapist coming on the ward racked her brains to think of some means of quieting the patient. The embroidery was occupational but had no slightest effect on her medical condition.

Finally, the therapist persuaded her to work on a hooked rug. She gave her dark and quieting colors—greens, grays, black—to work with. Her Italian friend actually sat down and worked quietly for hours, days, at a time. The doctors could not believe it was the same patient. As an experiment she was given embroidery again and she went back to her ravings and continuous walking. Of course, commercially, that embroidery was valuable and a gray hooked rug was nothing compared with it. But, medically, the hooked rug was quieting the patient, which nothing else had succeeded in doing.

I know of no better illustration to bring out the contrast between the medical and commercial emphasis.

Our patients come to us only on a doctor's prescription and I assure you we have quite an interesting list of prescriptions and a great variety of doctors and agents representing them. Only those patients are accepted for whom we feel we can do real medical work. I have tried hard in the few months I have been in charge of the clinic to avoid the "parking" variety of cases, as I call it, the one that uses a former illness as an excuse for inactivity and just a slight amount of amusing craft work.

I also try to pass a patient along to the next step as soon as he or she is ready for it—as soon as we have made our medical contribution to the case in hand. I keep in close touch with the physician or social agency that represents him and the patient is made to realize that we are, for the time being, his doctor's agent—simply carrying out orders for his best good. Perhaps you would be interested in a few specimen cases.

Case 1

One patient, Johnson, came to us for seven months. His diagnosis was "Provisional Post-encephalitis." He had a decided tremor in his right hand and leg. His memory and speech were affected. In fact, when he came to us, he had great difficulty in talking at all, for he could not remember the right words to use to express himself.

The result desired through treatment was to enable patient to return to work that would be remunerative. (He had been a carpenter.) Johnson was started on brass work, using his right hand in sawing it with a coping saw. He prespired excessively as he worked and tired easily. This craft, after three weeks, did not seem to be a wise one, so the therapist started him weaving on a two-harness foot-loom, making a coarse rag rug. This involved concentration, memory, coordination. He also began reading lessons to help him regain his speech and memory. After two weeks he showed improvement in his speech. This treatment was continued for two months, progressing from coarse to finer weaving on the same type of loom. He did a little light carpentry along with the other crafts but as he tired more easily doing this, it was discontinued.

Next he was taught to use a four-harness table loom, which

meant using his right hand to work the levers. On this he did pattern weaving for three months. Then he was given a four-harness foot loom, involving more concentration.

Carpentry was also started again (five months after entrance) and work on a bicycle jigsaw. He gained in his speech; his memory improved; the extensive perspiration stopped; and he had better control of his hand.

He left to visit relatives in the country. His condition had improved greatly, although the doctor felt he should continue supervised work with us longer.

Case 2

Another post-encephalitis patient, Mary, came to us after a history of four years' illness. She had a great deal of tremor in her left hand. She had a hysterical habit of rolling her eyes back and being unable to focus them again. She was restless and not interested in anything.

Mary came to the clinic every morning, beginning with a 40-minute period, gradually working up to three hours. The only thing that interested her at first was a braided rag rug, which she was allowed to start. After a day or two a little weaving on a two-harness foot loom was given her. She was taught macrame knotting and did a little along with other work.

Only once in the clinic did her eyes bother her. When apparently ignored, she did her work without trouble but the moment any attention was centered on her, up went her eyes.

After about five weeks' attendance at the clinic she went home for a visit. Her mother wrote the therapist as follows:

"I am writing to tell you of the wonderful improvement in Mary's condition. Her eyes, her chief trouble, bothered her continually for days heretofore. Now she has been home three weeks and they have not 'gone up' (as we term it) but three times and then for short duration, because she has herself so well in hand. She loves the work, talks of it all the while with keen interest, whereas before nothing seemed to interest her. She has been in this condition for four years—bashfulness, reticence and this eye plague causing her all sorts of misery. But at last I see an improvement."

She continued regular treatments at the clinic for three months. When she left she had gained in poise, self-control, self-confidence and use of her left hand. She had less rigidity in her body movements. She left on account of the expense of boarding in Boston and went to a trial position, with light work carefully supervised. Thus she would gain an added sense of responsibility.

Case 3

To mention some functional cases:

Jerry Colieri came to increase flexion of the left wrist, after

an operation following the fracture of the scaphoid. He came daily for one week, working from ¾ hr., with rests, to 1¾ hr. He worked on a braid-weave rug, emphasizing wrist flexion. He did macrame knotting. He bounced a ball. He turned valves and wheel on a book press, to get the same motion which he had to use in his work, where he turned valves off and on rapidly.

After six days he had 27 degrees of flexion, whereas he had but 15 degrees when he entered. He was allowed by the doctor to return to work, as the insurance company was unwilling to carry him longer, and he could do some work on his job.

Case 4

Another functional case of especial interest was that of George Smith. He had a fracture of the fourth metacarpal of the right hand. The knuckles were depressed and he had no power to flex or extend his finger except when the site of the fracture was fixed. There was no union of the fracture and the doctor sent him to build up muscle tone before he operated, not wishing to do so unless muscle atrophy could be prevented.

Smith was started on basketry to increase circulation and develop flexion. He worked three hours daily. After two mornings he reported that the exercise relieved the stiffness and pain in his muscles which he felt in the morning and he had discontinued the use of hot compresses on his hand.

Next he was given wood carving, using a tool, padded to meet what hand flexion he had. This made pressure at site of fracture. The padding was made smaller as his flexion increased. He continued this for ten days and was then given a coping-saw with handle smaller than carving tool. He used this for some jewelry work. He continued both jewelry and light carpentry, involving the use of various tools, for one month, a total of about six weeks, and then was operated on successfully. He returned after the operation for about ten days to limber up the hand and then went back to work much sooner than the doctor had anticipated when he sent him to the clinic.

These are but a few of many cases of which I might tell you but they serve, I hope, to show you a bit more vividly the possibility of helping different types of cases.

In closing, may I reiterate that we as physiotherapists and occupational therapists cannot cooperate too closely—cannot fail to recognize that we each have an important part to play in our patient's recovery and can only accomplish the best for each patient by the most complete understanding of each other's methods.

Physiotherapy, Occupational Therapy, Social Service—each has much to give the other. Each makes a different contact with the patient. Each gets a different reaction from the patient. By realizing that and conferring, it will mean the bets results to the patients in whom we all are genuinely interested and whose recovery we desire.

Boston, Mass.

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ARTICLE 11—Purpose

The purpose of this association shall be:

(a) To form a nation-wide organ which will establish and maintain a professional and scientific standard for those engaged in physical therapy

(b) To promote the science of physical therapy by cooperating in the establishment of standardized schools of physical therapy and encouraging scientific research in the profession

(c) To cooperate with or under the direction of the medical profession and to provide a central registry which will make available to the medical profession efficiently trained assistants in physical therapy.

(d) To provide a bureau of information which will be available to members of the medical profession and the general public as well as to the members of the association

(e) To bind the local chapters together.

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